

je crois aussi plus faciles, ont été ouvertes, et c'est l'œuvre de ceux qui veulent servir la science et leur pays de discerner ce que les éléments peuvent recevoir de l'immense élaboration qui s'est accomplie depuis Gauss jusqu'à Riemann."

There is in the present tract a clear exposition of the elementary applications of Trilinear and Triangular Coordinates, and just a passing glance at Polar reciprocals.

In such a work we do not look for anything original, but for clearness and correctness. These ends, we think, have been attained, and we wish Dr. Wright health and leisure to enable him to carry out his design.

Grundriss der chemischen Technologie. Von Dr. Jul. Post. (Berlin: Robert Oppenheim, 1877.)

DR. POST, who is known to chemists as an able Privat Docent at the University of Göttingen, has, like many other teachers, felt the great necessity of a manual of chemical technology, suited to the requirements of students who desire a general training in that branch of applied chemistry. A considerable number of excellent treatises, as, for example, those of Knapp, Wagner, Bolley, Kerl, and Stohmann, already exist in German, and some of them have been translated into English, but no one of them is exactly adapted to the class-room. Their excellence consists in their completeness as works of reference; indeed as such they may be said to be invaluable to the chemical manufacturer; but the mode of their arrangement renders them of comparatively little value as aids to systematic study. Dr. Post has succeeded in producing a work which, within the compass of some of our smaller chemical manuals presents a complete outline of the present position of chemical technology. His book thus serves as a fitting introduction to the larger and more special treatises above mentioned.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Colour-Sense in Birds

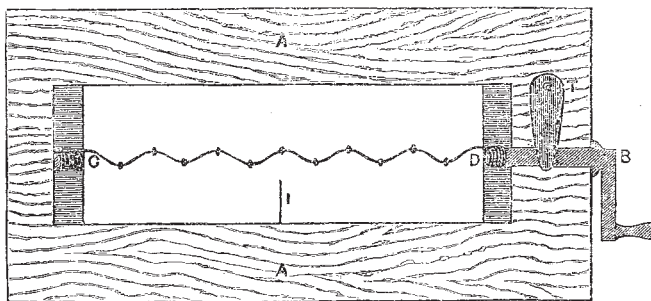
I HAVE been lately watching, with great delight, two goldfinches building their nest. They placed it nearly at the end of an outside branch of a young sycamore tree, so that there was nothing but sky above it, and the gravel path below. The window from which I observed them, being never opened, and well covered with flowers in pots and a blind, seems to have caused them no alarm, although not more than two yards distant from them; and their object appears to have been to make their nest invisible from below. To this end they chose their building materials with such skill and such colour-matching power that if one had not seen the nest built it would be quite impossible to discover it; to match the tree they took its long flexible blossoms, and to match the sky the equally long and flexible stalks and flowers of the garden forget-me-not, of which a bed was close at hand in full bloom. I watched them carefully, and, as far as I could see, they used no other materials than these flowers, though I saw one of them attempting to get the dirty-white cotton tie off a budded rose-tree. At all events the nest was mainly built of them. The blue of the forget-me-not has of course faded, but the general effect from below is that of a scarcely visible grey-green thickening of one of the bunches of sycamore leaves. They seemed to enjoy flinging their flower-wreaths about. And that leads to the question whether birds—who are in many ways like children—do not often out of mere playfulness and love of colour, pull to pieces yellow crocuses and other bright flowers. While my pen is in my hand I may mention, with reference to Dr. Muirhead's communication on the subject of noise causing a sensation of colour, that I have frequently observed whilst tuning a harp,

that the sudden breaking of a string will cause a curious taste and sensation in the mouth, like that produced by a piece of silver and one of zinc placed above and beneath the tongue, when they are made to meet.

A Simple Wave-Motion Apparatus

It has been suggested to me that I should publish a description of a simple and portable wave-motion apparatus, devised by me a year or two ago, which has given satisfactory results to others as well as to myself. I therefore send the description.

In the figure A A represents an ordinary wooden lantern slide, with a rectangular aperture, which may vary in size according to the size of the lantern condensers, the sketch being half size for 4-inch condensers. A small winch, B, is fitted into the slide at one end of the aperture, and held in its place by the tongue, T. The spindle, B D, is milled or otherwise roughened near the end, D. A brass stud similar in shape to the milled end of the spindle, but smooth and slightly smaller, is fixed in the opposite side of the aperture at C. A helix of 25-gauge hard brass wire is wound on a spit of the same size as the smooth stud, taking care to wind the coils close together; about fifteen turns of the helix are cut off, and the middle five turns drawn out till they form a perfect wave similar to the figure when held up to the light. The length of the helix should then be the same as C D. One end of the helix is pushed tight on the milled end, D, and the other end is slipped loosely over the stud, C, so as to work



on it like a swivel, to keep the end of the helix true when the winch is turned. A little bead of wax is melted on each crest and hollow of the wave to represent particles, and the essential parts of the apparatus are complete. On placing it in front of the lantern, and focussing, a distinct and striking image of a moving wave with its vibrating particles is produced by turning the winch.

If the helix is not perfectly straight the image of the wave will rise up and down more or less as a whole; the helix should then be straightened or "set" with the fingers till true. When once set thin glass plates may be placed on each side to protect it from injury. An index, I, of wire, may be fixed so as to give a means of proving that the particles only move up and down.

A modification I have tried by using a dark wire with bright silver beads, on a velvet back-ground in the aphic gescopie, is more difficult to make and use. I therefore prefer the apparatus as sketched above.

Of course the amount of finish depends on the taste of the user, &c. A pasteboard frame instead of mahogany, a wire bent twice at right angles instead of a finished brass winch, and tied to the frame by two bits of wire instead of let in, &c., may be used, thus reducing the cost to a few halfpence.

In use it will recommend itself.

W. JESSE LOVETT

Birmingham

Atmospheric Currents

A CONTROVERSY was recently waged in your columns as to the course which is pursued by the hot water-laden air of the equatorial regions in its journey to the poles. Both combatants seem to adopt what I may call the sheet-theory, which regards the winds as moving in sheets or strata, and gliding over and under each other at the polar and equatorial sides of the calms of Cancer and Capricorn, a process which would inevitably result either in both opposing winds being torn to tatters, or in their commixture and neutralisation. Surely the truth is that like all other moving fluids, the air will seek equilibrium in the direction of least resistance, and will carve out for itself wide channels in accordance with local conditions from the poles to the equator,

and from the equator to the poles—channels which will not intersect or interfere with one another, except when affected by disturbing causes.

One possible cause of change in this direction of least resistance or normal channel in the case of the south-west wind of these latitudes may possibly be a shifting of the thermal pole. Suppose, for instance, we have any reason to surmise that the centre of greatest cold is now on the American side of the true North Pole and at another time on the Asiatic side, we have at once a satisfactory explanation of observed variations in the prevalent direction of the main channels of the water-laden winds of the northern hemisphere.

I will now as briefly as possible state my reasons for suspecting that such is actually the case.

Since 1873 the south-west winds have prevailed very considerably over the average in Europe, and as a natural consequence we have had continued floods all over the west of this continent. In Asia, during the same period the water-laden winds have been fearfully under the average, the rainfall during the last three years having been about nine inches below the average of the previous half-dozen. Famines, of course, have been the result.

If my theory is correct we should expect to find that the thermal pole has been situated during the last three or four years on our own side of the North Pole.

Now in 1872 Capt. Hall, of the *Polaris*, saw unmistakable signs of an open polar sea where Capt. Nares, in 1875, saw nothing but a vast wilderness of ancient ice. In a former letter of mine which appeared in NATURE (vol. xv. p. 116) I attempted to reconcile these apparently conflicting observations on the supposition that this palæocrystic wilderness is in reality a vast floating island of ice some hundreds of miles in diameter. I called to mind Sir E. Parry's disappointing experiences in 1827 in the *Hecla*, when, after a toilsome journey northwards on what he believed to be the main pack, he found he was after all drifting southwards; whereupon he concluded his supposed main pack must be a loose floe of immense extent.

Is it not equally probable, to say the least of it, that he was on the main pack—on the palæocrystic island—and that he caught it on the move towards our shores of the Arctic Sea?

Be this as it may (and it is merely a suggestion) it is certain that five years later occurred the terrible famine of 1832 in India, and five years is just the time required, according to Dr. Hunter, for the effects of the proximate cause of drought (whatever that may be) to attain its maximum, according to the law of the "multiplication of effects."

Although I have examined the records of the winds at the Meteorological Office, I will add nothing more, as I fear I have already exceeded my proper limits.

WORDSWORTH DONISTHORPE

Yellow Crocuses

A LETTER in NATURE (vol. xvi. p. 43) calls attention to the destruction of the flowers of the yellow crocus by the sparrow. I have for many years been a cultivator of the crocus, both yellow, white, and purple; this spring they flowed abundantly, the white and purple blooming undisturbed, the yellow picked and torn. My gardener and I talked the matter over but could find no solution of the problem. As this has been my experience in former years, and the fact is now corroborated by general experience, can no naturalist discover the reason, or must it still be left a secret in the bosom of pert little *Fringilla domestica*?

A. H.

Complementary Colours

IN connection with this subject, which was referred to in Mr. Terrill's letter in NATURE for May 17, perhaps the following homely way of illustrating the fact that the combination of two complementary colours produces white may interest your readers. If a tumbler of beer be held in front of the green glass shade of an ordinary reading lamp, it will be found on looking through the beer at the shade that the tumbler appears to be filled with an almost colourless liquid.

J. ROMILLY ALLEN

Chromatic Aberration of the Eye

THERE is a slight inaccuracy in your report of my communication of May 12th to the Physical Society, wherein I am made to affirm that a blue object and a red object cannot both be in focus at once unless the blue object be the more distant. The next sentence of your report, and indeed the whole tenor of my communication imply the reverse condition, that the blue rays

should come from the less distant source. The dispersion of the eye takes place in the same sense as its refraction; hence the adjustment of the eye to focus may be the same for blue rays proceeding from a body near the eye as for red rays proceeding from an indefinitely distant luminous source; as, indeed, Fraunhofer proved half a century ago.

S. P. THOMPSON

University College, Bristol, May 25

A Correction

PERMIT me to explain that the subject of my note, read at the last meeting of the Astronomical Society, was not my chart of 324,912 stars, though I had occasion in the course of it to mention that chart. My note referred in reality to a paper read at the preceding meeting, and relating to the general subject of the distribution of stars in space.

RICHARD A. PROCTOR

DR. PHILIP P. CARPENTER

WE regret to announce the death at Montreal, in his fifty-eighth year, of Dr. Philip P. Carpenter, formerly of Warrington, one of the most scientific conchologists of our time. Taking up this pursuit, in the first instance, merely as a recreative occupation, he was led by his friend, Dr. J. E. Gray, who saw his remarkable aptitude for it, to make it one of the principal objects of his life; and he brought to it a mind trained in those scientific habits which prevented him from ever becoming the mere species-monger, whilst specially delighting in that study of minute detail which is required for the true determination of specific types and their geographical distribution. It was well observed by Dr. Hooker, in his introductory essay to the "Flora of New Zealand," that "a wider range of knowledge and a greater depth of study are required to prove those dissimilar forms to be identical, which any superficial observer can separate by words and a name;" and this wide range of knowledge and thoroughness of research were the essential characteristics of all Dr. P. P. Carpenter's conchological work. The opportunity having occurred to him more than twenty-five years ago, while residing at Warrington, of studying a large collection of shells formed at Mazatlan, in California—after Mr. Cumming had selected from it what he considered the new specific types, which he caused to be described by Mr. C. B. Adams—Dr. P. P. Carpenter was impressed with the fact that Mr. Cumming had left behind him those *intermediate* forms, the study of which would prove that many of his supposed species are mere varieties; and having brought the importance of such study before the Zoological Section of the British Association, he was requested to prepare a report on the present state of our knowledge with regard to the mollusca of the west coast of North America, which was published in the *Transactions* of the Association for 1856, and at once took rank as a most able and conscientious work. A Supplementary Report on this subject, marked by the same "wide range of knowledge and depth of study," was published in 1863. Besides these, several monographs, prepared by Dr. P. P. Carpenter on particular groups of shells in the Cumming Museum, were published in the *Zoological Proceedings*. So high was the reputation which his Reports acquired for him among American naturalists that he was invited by Prof. Henry of the Smithsonian Institution at Washington to assist him in the arrangement of its national collection of shells; and having been led in 1865 to take up his residence in Montreal, he was subsequently engaged in similar work for other museums in the Northern States. He soon acquired in the city of his adoption the character he had left behind him in Warrington, of being ever ready for any kind of philanthropic labour; and especially distinguished himself by his untiring advocacy, through evil as well as good report, of the sanitary reforms which he saw to be greatly needed. There is reason to believe that the typhoid fever which brought his useful life to a close was engendered in the foul air of the building in which he was accustomed to carry on his scientific work.